



Three-Channel Constant Current LED Driver

Features

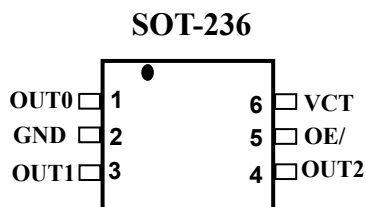
- . Constant-current driver for parallel connected LEDs
- . LED current fixed by resistance of one external resistor only
- . Excellent output current matching:
 - Channel to channel skew < $\pm 3\%$
 - Chip to chip skew < $\pm 6\%$
- . Constant output current range: 5-40mA
- . PWM and analog brightness dimming control function
- . Supply voltage: 3V~15V
- . Packages: SOP-236

Product Description

SCT2303 is designed to drive multiple LEDs in series from a high input voltage rail. SCT2303 contains three output channels which are regulated to provide constant current sinks for driving LEDs of large range V_F variations. The SCT2303 provides a simple and high efficiency solution for three channels of any color LEDs with excellent current matching capability.

In the field of LEDs driving applications, users can simply adjust the output current from 5 mA to 40 mA through an external resistor, R_{EXT} to control the light intensity of LEDs. If necessary, the SCT2303 can easily work with any boost converter circuit which needs constant current sources. The SCT2303 guarantees to endure maximum DC 17V at each output port.

Pin Configuration

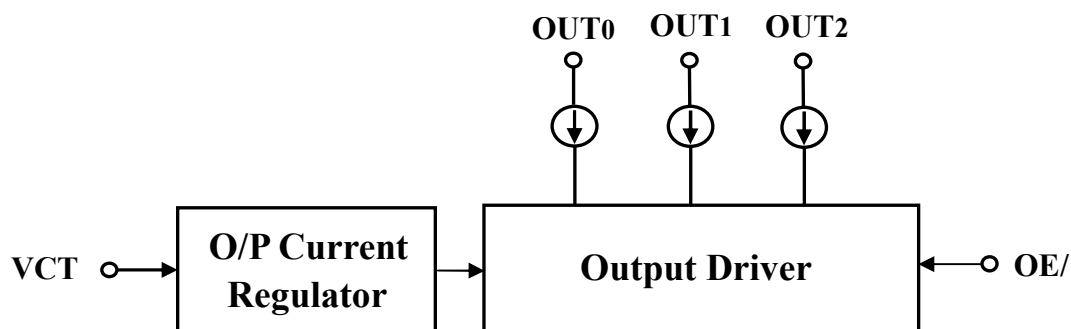


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Block Diagram



Terminal Description

Pin No.	Pin Name	Function
1	OUT0	Output terminal 0
2	GND	Ground terminal
3	OUT1	Output terminal 1
4	OUT2	Output terminal 2
5	OE/	Input terminal used to turn on/off all the LED
6	VCT	Input terminal used to set up all output current

Ordering information

Part Number	Marking	Package
SCT2303AS1G	2303	Pb free SOT-236 with thermal pad(TP)

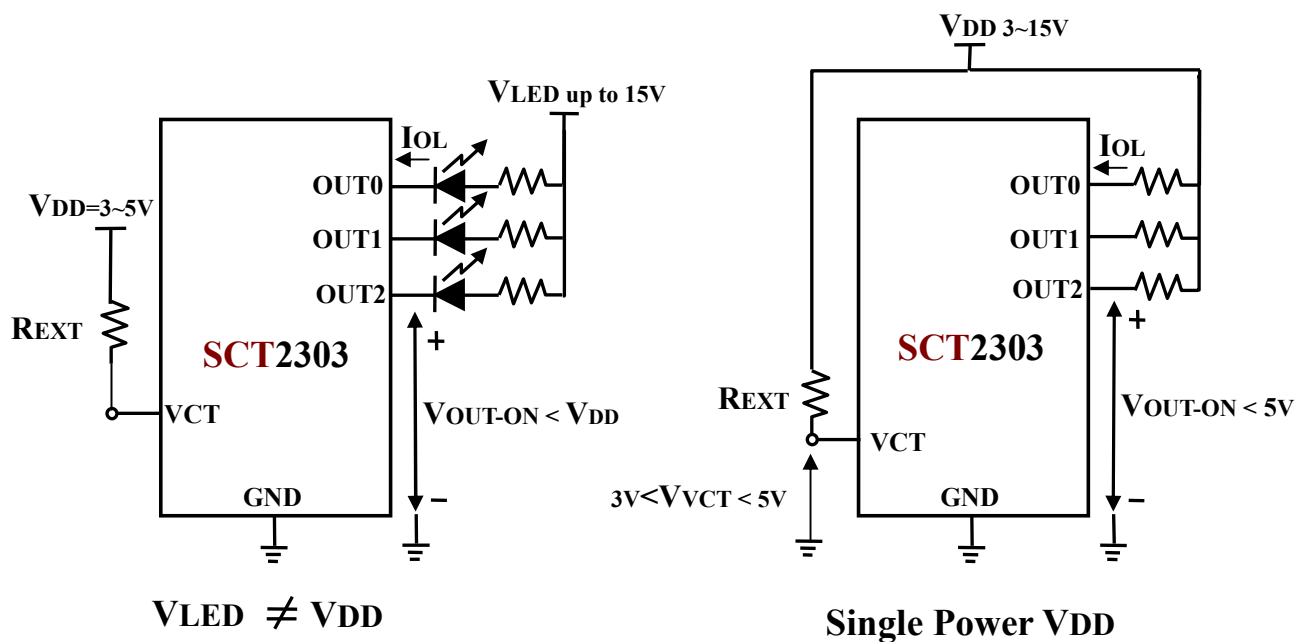
Maximum Ratings

Characteristic	Symbol	Rating	Unit
Output enable bar input voltage(OE/)	V_{IN}	3 ~ 6	V
Output current (Depends on V_{OUT})	I_{OUT}	+60	mA
Output voltage	V_{OUT}	0.8~17.0	V
Total GND terminals current	I_{GND}	200	mA
Operating temperature	T_{OPR}	-40~+85	°C
Storage temperature	T_{STG}	-55~+150	°C

Recommended Operating Conditions

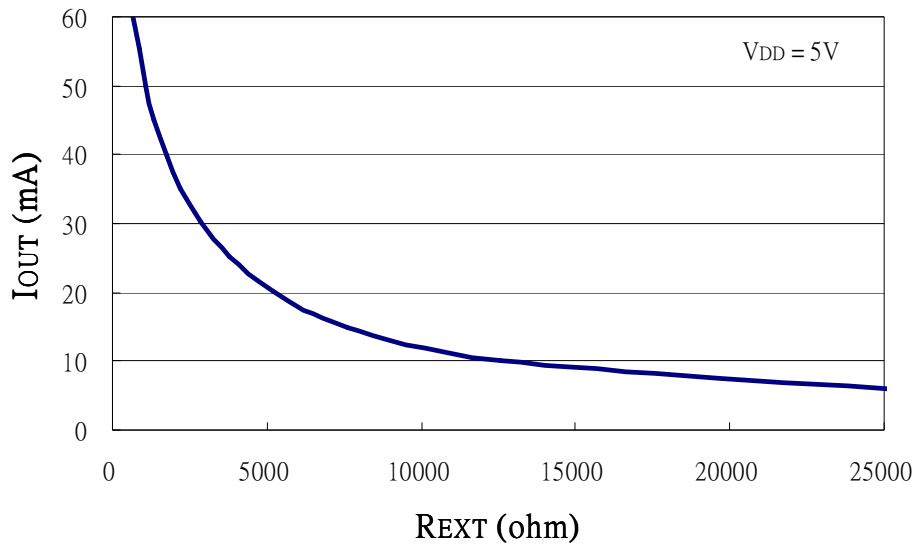
Characteristic	Symbol	Condition	Min.	Typ.	Max.	Unit
Output voltage	V_{OUTn}	OUT0 ~ OUT2	1.0	-	15(off) $V_{VCT(On)}$	V
Output current	I_{OUT}	DC test circuit	10	-	40	mA

Test Circuit for Electrical Characteristics



Adjusting Output Current

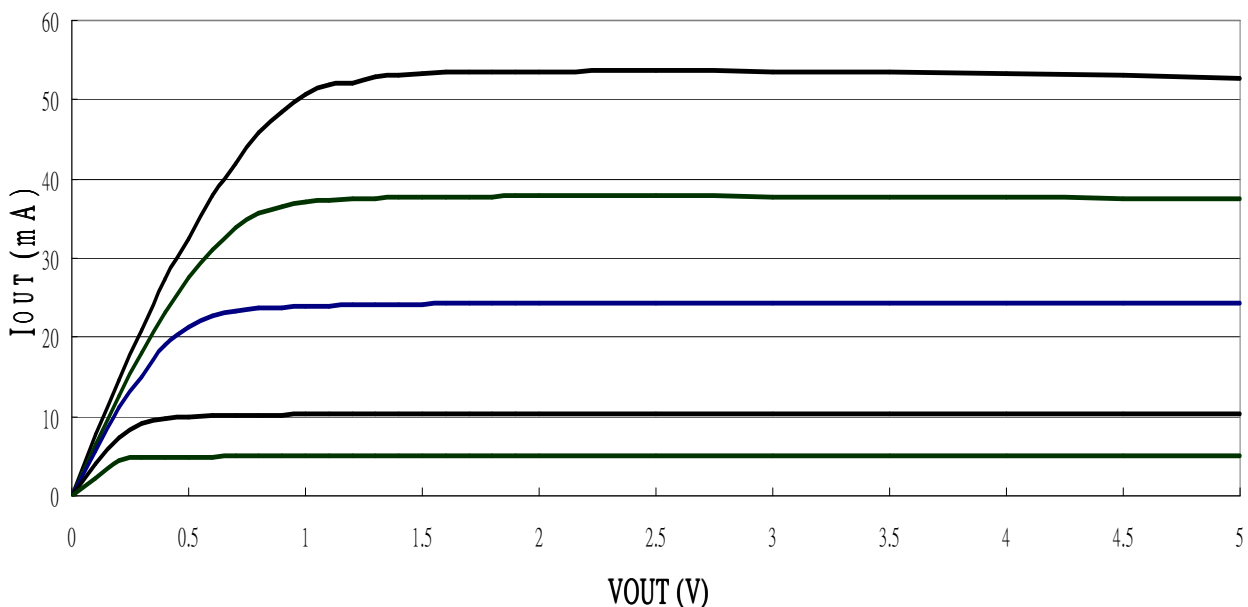
The output current (I_{OUT}) are set by one external resistor at pin ADJ. The relationship between I_{OUT} , resistance R_{EXT} and the power (V_{VCT}) is shown as the following figure. The V_{VCT} is the power which the resistor is connected.



Constant Current

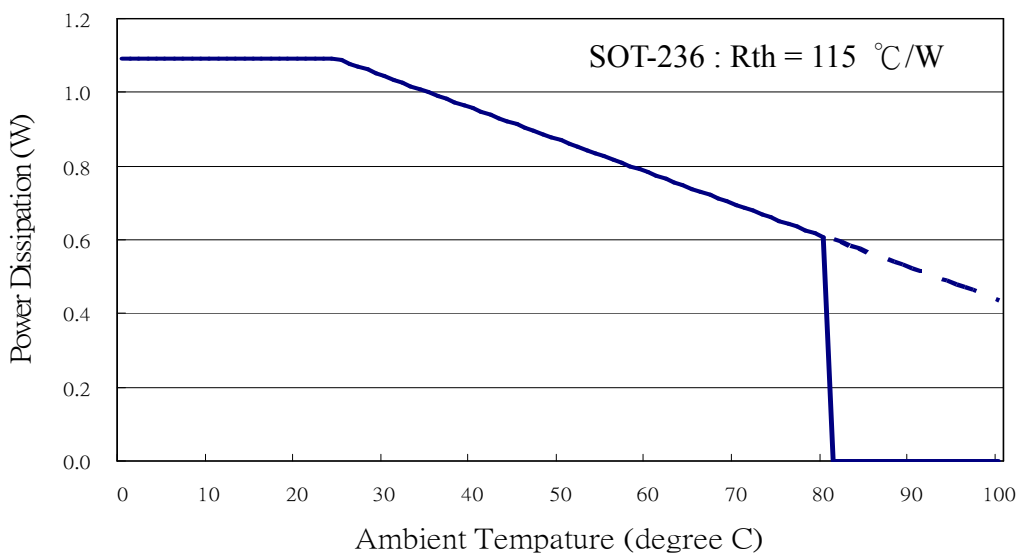
The current characteristic of output stage is flat. The output current can kept constant regardless of the variations of LED forward voltage when V_{OUT} is larger than 1.0V. The relationship between I_{OUT} and V_{OUT} is shown as :

$$* R_{EXT} = ((V_{DD} - 2.56) * 60 / I_{out}(mA)) - 1.8 \text{ K OHM}$$



Power Dissipation

The power dissipation (P_D) of a semiconductor chip is limited by its package and ambient temperature. The maximum allowable power dissipation (P_D) is determined as $P_{D(max)} = (T_j - T_a)/R_{th(j-a)}$ where T_j : the chip junction temperature, T_a : ambient temperature, $R_{th(j-a)}$: thermal resistance. For SSOP packages, the relationship between P_D and T_a is shown as the following figure.

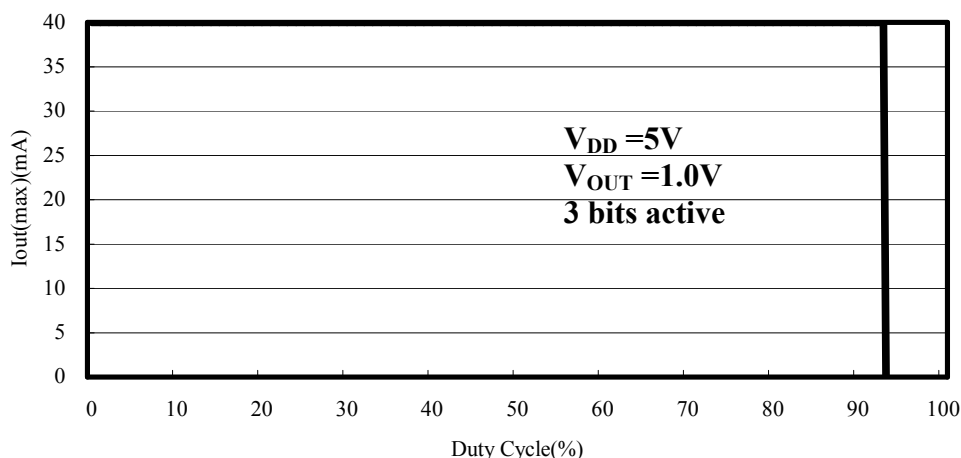


Maximum Output Current

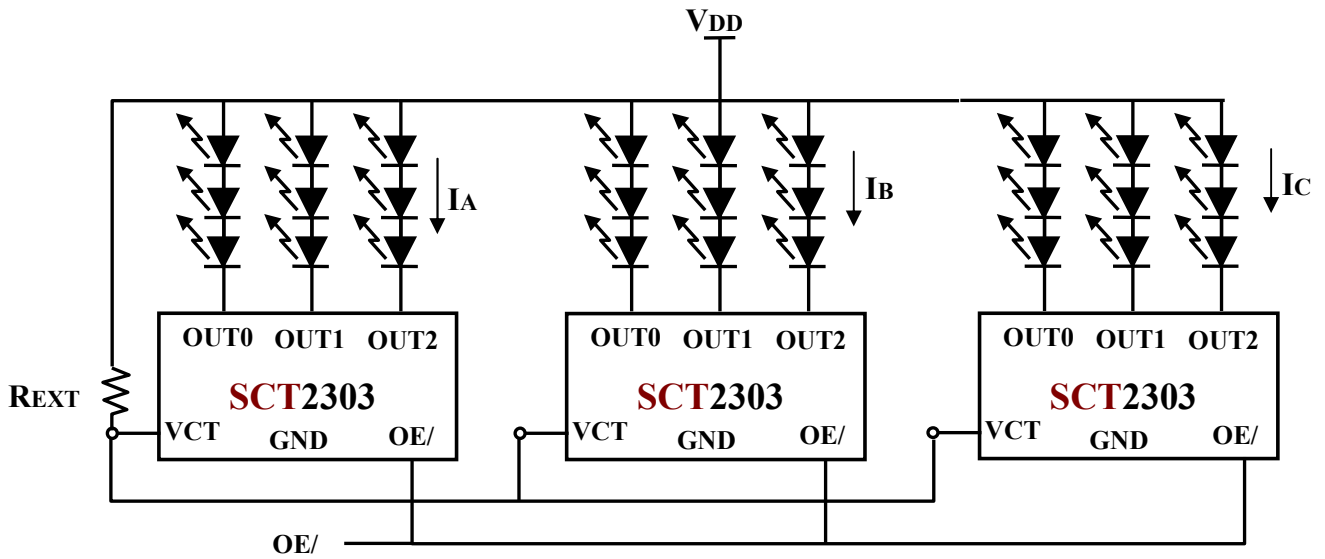
In practical case, the SCT2303 turn on the output in partial period. So the actual package power dissipation is $P_D(act) = (I_{DD} \cdot V_{DD}) + (\# \text{ outputs} \cdot I_{OUT} \cdot V_{OUT} \cdot \text{Duty})$.

Therefore, to keep $P_D(act) \leq P_D(max)$, the allowed maximum output current be calculated from the equation: $I_{OUT} = (P_D - I_{DD} \cdot V_{DD}) / (\# \text{ outputs} \cdot V_{OUT} \cdot \text{Duty})$

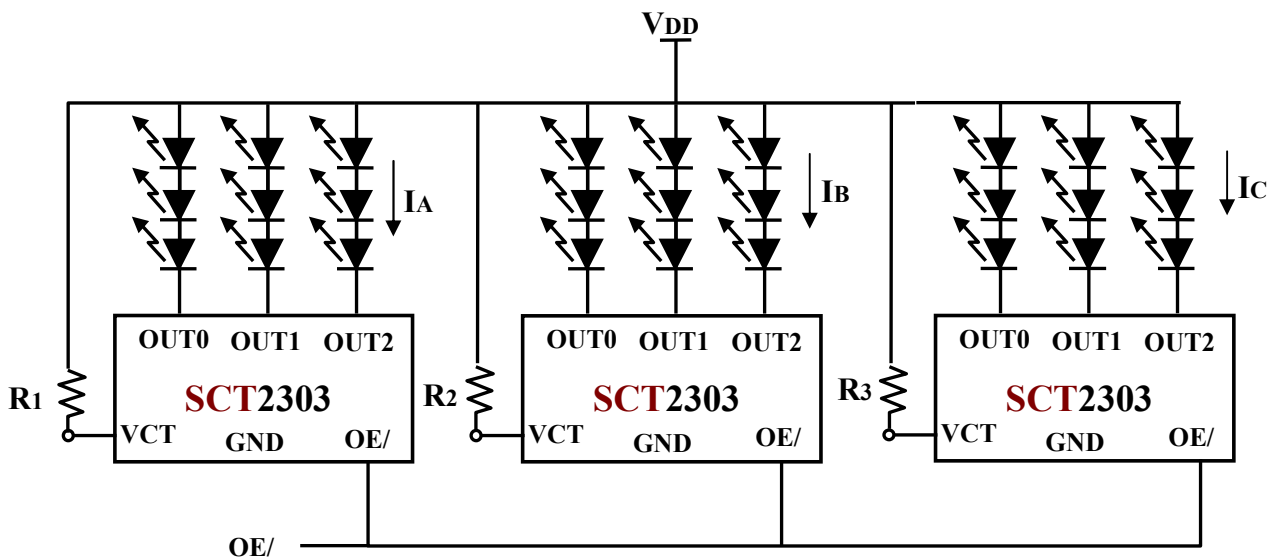
So the relationship between $I_{OUT}(max)$ and T_a is shown as the following figure:



Application circuit example



$I_A = I_B = I_C$



$I_A \neq I_B \neq I_C$, Dimming by global OE/

Layout Guide

Use the following general guide-line when designing printed circuit boards (PCB) :

Decoupling Capacitor

Place a 0.1 μ F decoupling capacitor between VDD and GND pins of SCT2303. Locate the capacitor as close to the pins as possible.

External Resistor (R_{EXT})

Locate the external resistor as close to the R_{EXT} pin as possible to avoid the noise influence.

Current-limited Resistor

It is recommended to use 22/33 Ohm series resistors in the power connections of offending SCT2303s in conjunction with decoupling capacitors shunting the ICs.

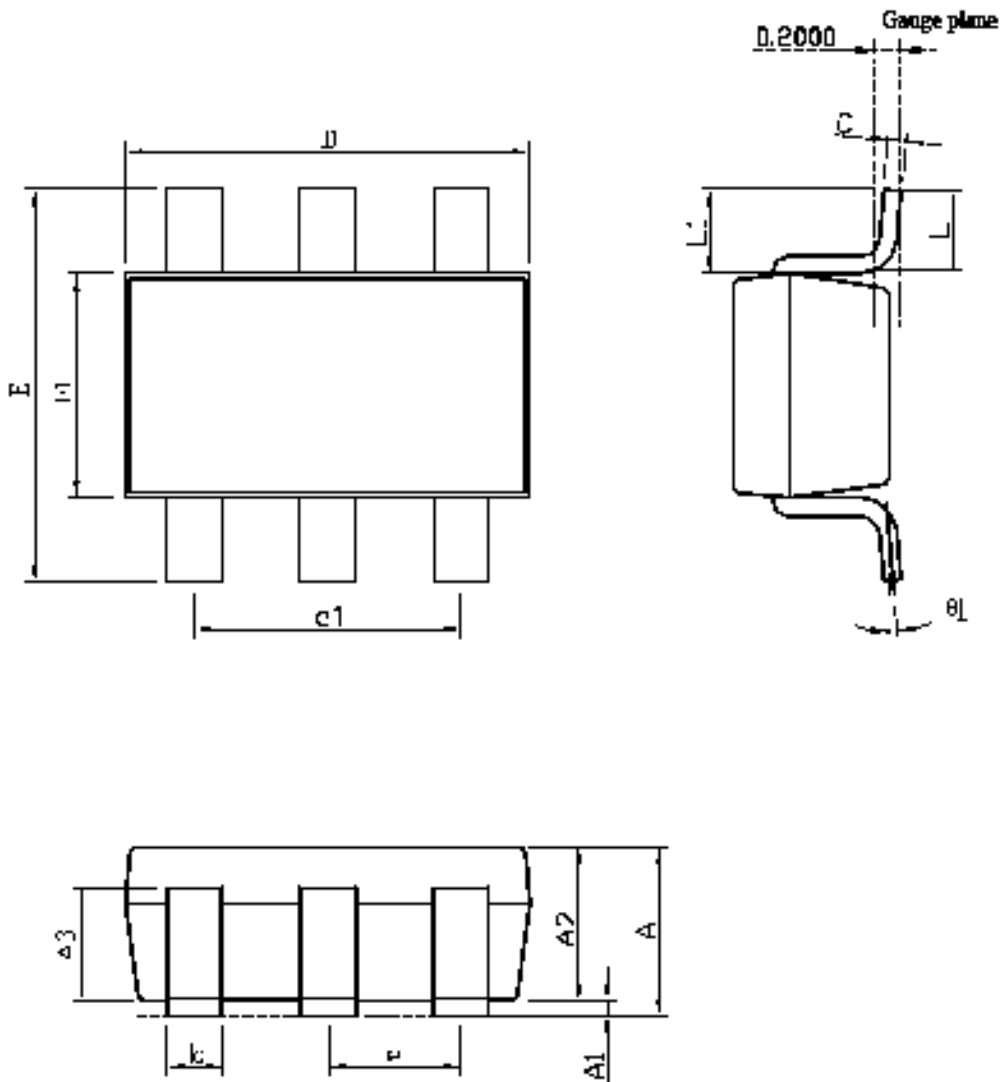
Ground

Maximizing the width and minimizing the length of GND trace improve efficiency and ground bouncing by effect of reducing both ground parasitic resistance and inductance.

Information provided by StarChips Technology is believed to be accurate and reliable. Application circuits shown, if any, are typical examples illustrating the operation of the devices. Starchips can not assume responsibility and any problem raising out of the use of the circuits. Starchips reserves the right to change product specification without prior notice.

Package Dimension

SOT-236



SYMBOL	DIMENSION (mm)			DIMENSION (mil)		
	MIN	NOM	MAX	MIN	NOM	MAX
A	1.00	1.10	1.40	39.4	43.3	55.1
A1	0.00	-	0.10	0	-	3.9
A2	1.00	1.10	1.30	39.4	43.3	51.2
A3	0.70	0.80	0.90	27.6	31.5	35.4
b	0.35	0.40	0.50	13.8	15.7	19.7
C	0.10	0.15	0.25	3.9	5.9	9.8
D	2.70	2.90	3.10	106.3	114.2	122.0
E1	1.40	1.60	1.80	55.1	63.0	70.9
e1	-	1.90	-	-	74.8	-
E	2.60	2.80	3.00	102.4	110.2	118.1
L	0.37	-	-	14.6	-	-
$\theta 1$	1°	5°	9°	1°	5°	9°
e	-	0.95	-	-	37.4	-
L1	0.5	0.6	0.7	19.7	23.6	27.6